Mars Global Digital Dune Database—Composition, Thermal Inertia, and Stability

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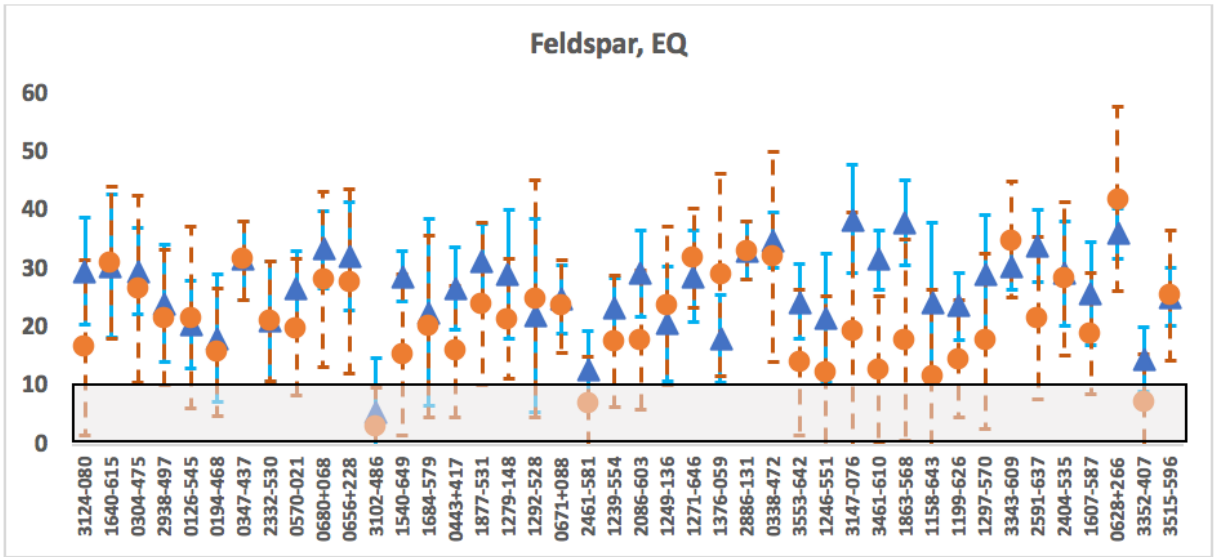
Appendix 1. Graphs pertaining to the spectral glitch.

A spectral glitch known to affect the shape of the approximately 800–1,200 cm^{-1} silicate absorption (Pankine, 2015; Joshua L. Bandfield, Space Science Institute, written commun., 2018) has been observed in the spectral data beyond about ock number 7,000 and continues to increase in severity as the ock numbers increase. Feldspar and sulfate mineral abundances are the two mineral groups most affected by this spectral glitch (see "MGD^3 Data Processing and Methodology" section of report). Therefore, provided in both the equatorial and south polar workbooks is a Global Summary worksheet for averaged mineral abundances for ock numbers less than 7,000 ("Global Summary ocks <7000") and a second Global Summary worksheet that has averaged mineral abundance values for all ocks ("Global Summary all ocks"). The graphs in figure 1.1 highlight the differences this radiometric error can have on modeled mineral abundances across a dune field.

As previously mentioned, the spectral glitch can affect the shape of the approximately 800–1,200 cm^{-1} silicate absorption band, causing an overestimation of sulfate and an underestimation of feldspar present on the surface of Mars. The graphs in figure 1.1 reflect this observation. Feldspar and sulfate have the largest and most consistent change in the data when ocks greater than 7,000 are excluded from the averaged mineral abundance calculations. When ocks greater than 7,000 are factored out, feldspar increases in abundance and sulfate decreases. The identification of high-silica phases, olivine, and pyroxene are not greatly affected by this spectral glitch. Abundances are either very similar or have minor increases or decreases in abundance, but do not show the systematic and consistent change demonstrated by feldspar and sulfate.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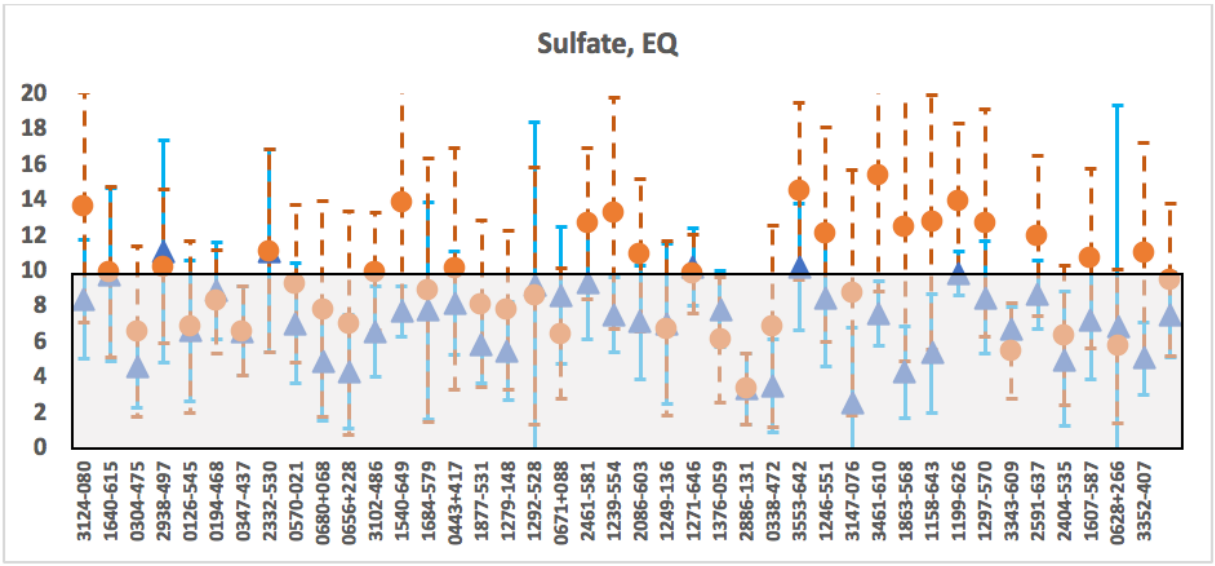
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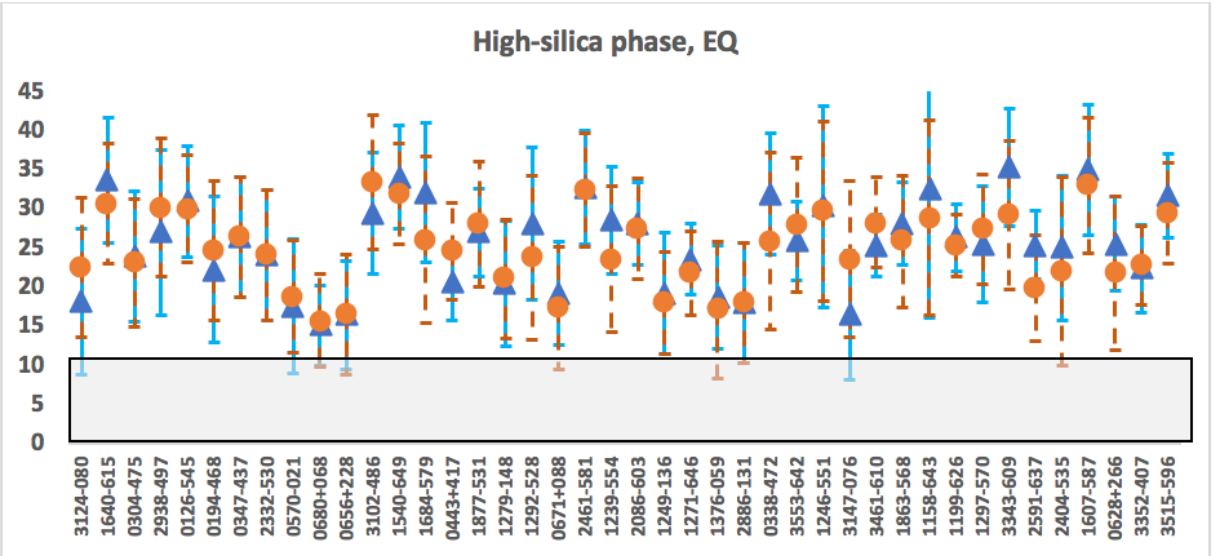
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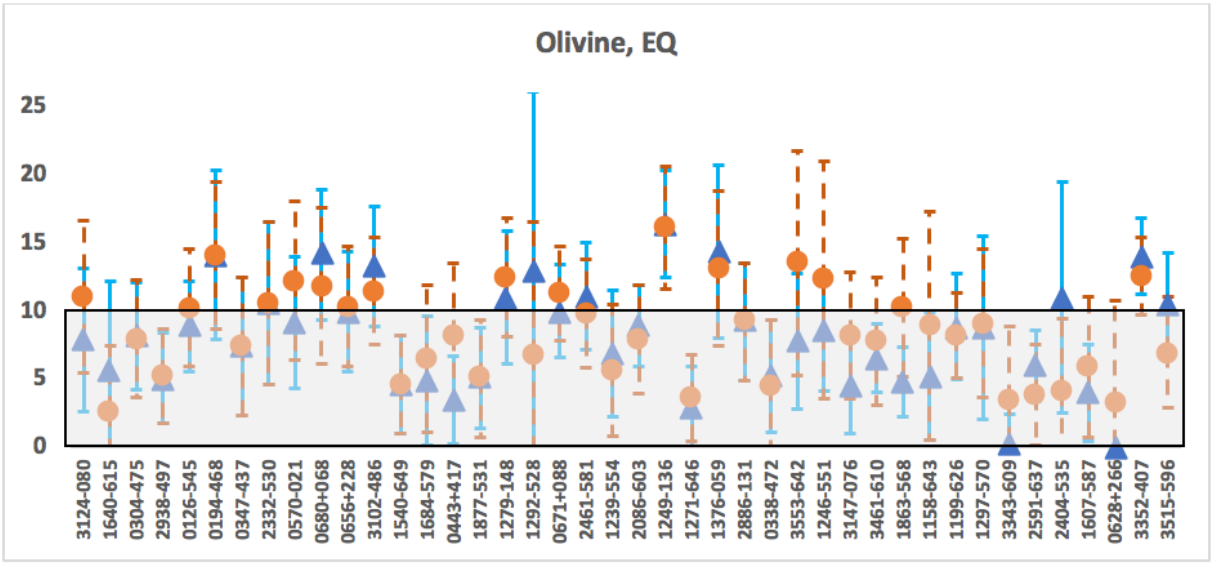
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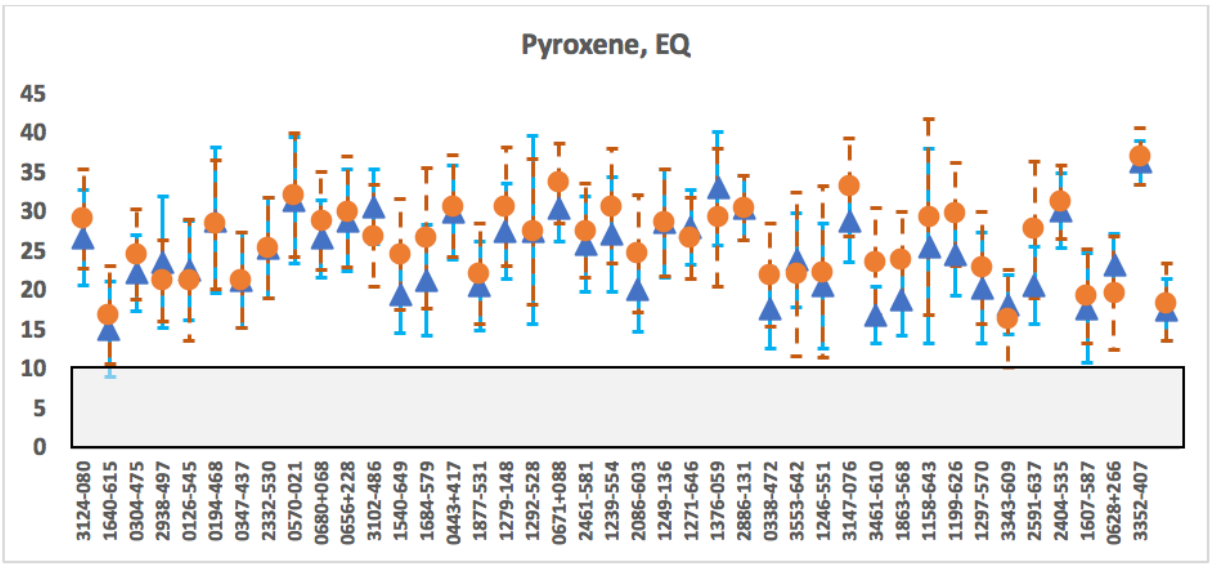
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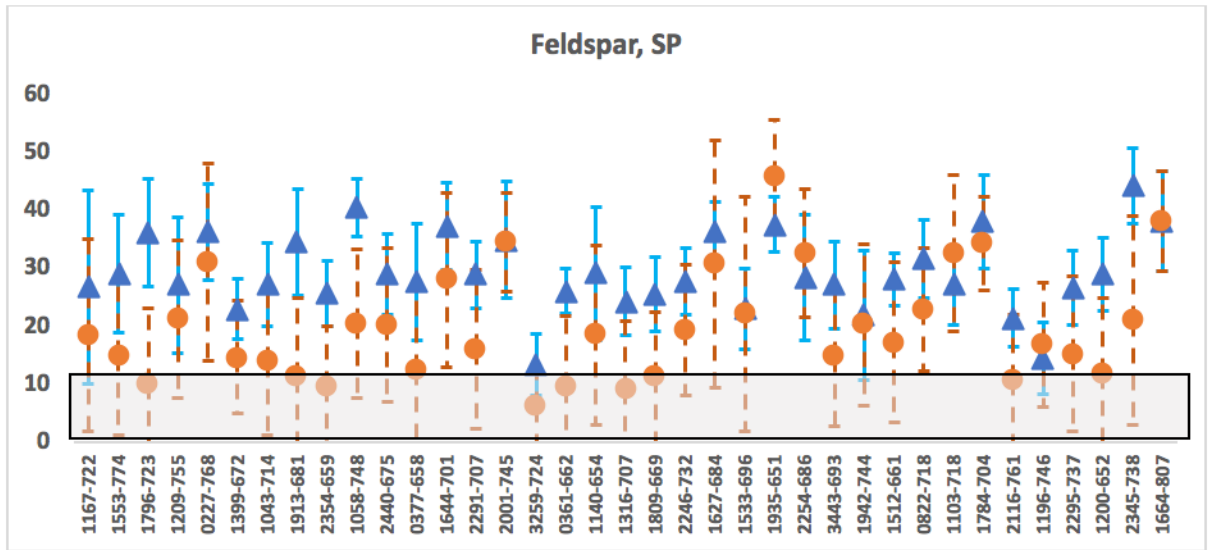
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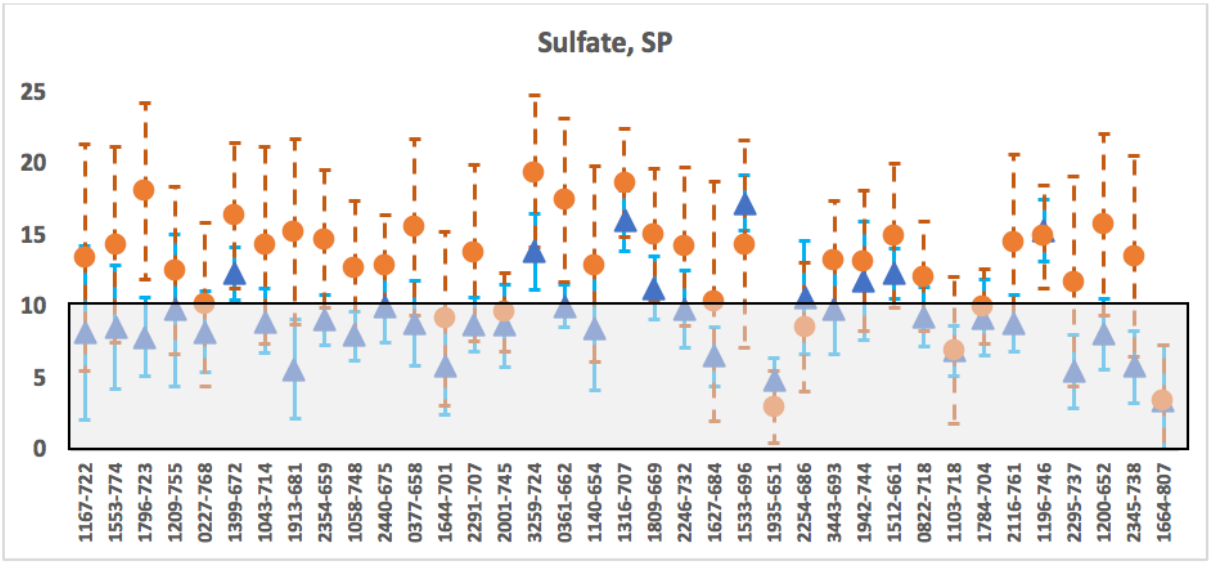
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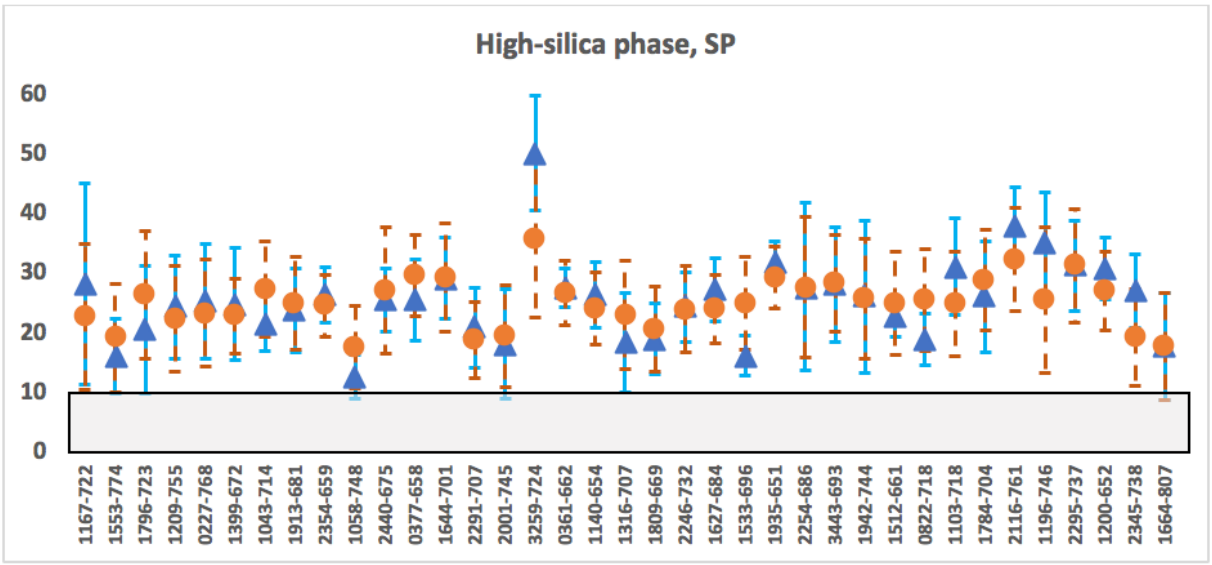
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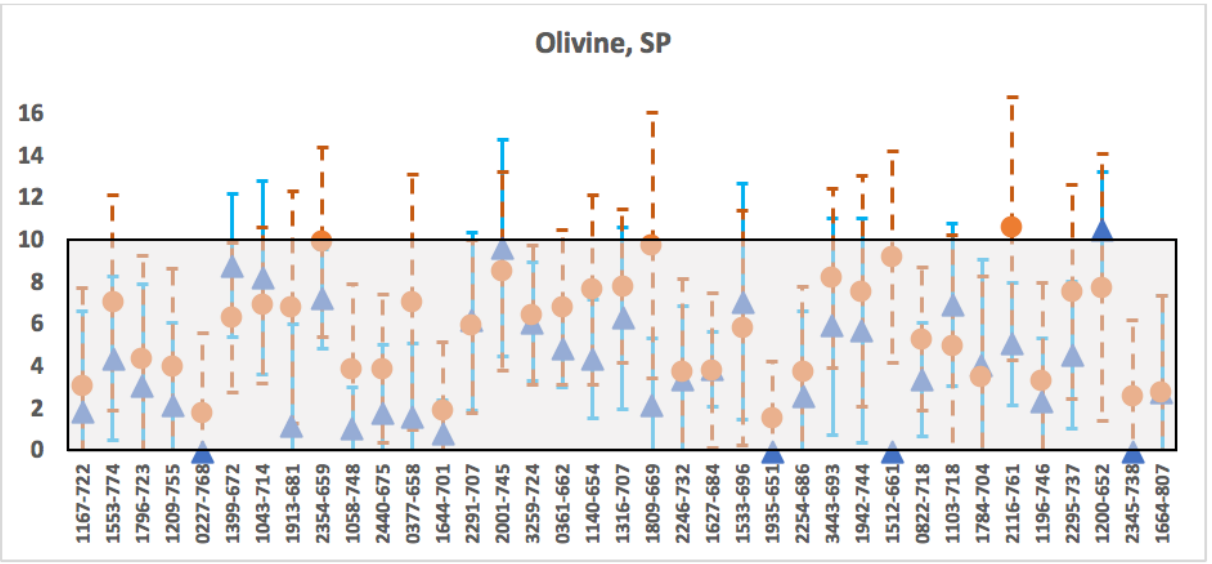
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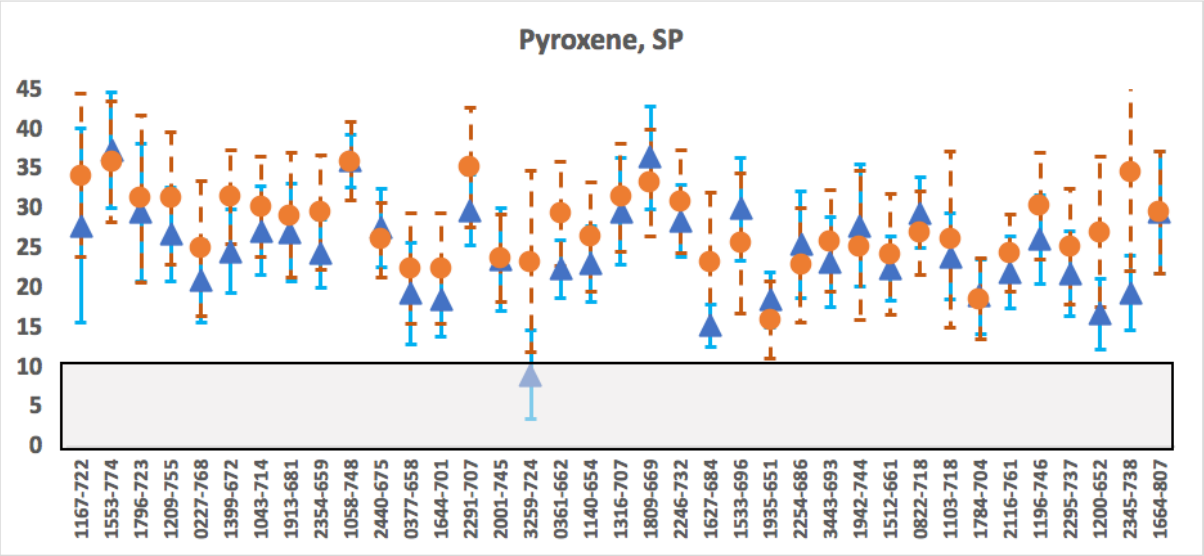

Figure 1.1. Plots showing averaged mineral abundances (in percent) by dune field for feldspar, sulfate, high-silica phase, olivine, and pyroxene at the equatorial and south polar regions. Blue triangles represent averaged mineral abundances for only ock numbers less than 7,000 (values are from the "Global Summary ocks <7000" worksheet in both equatorial and south polar workbooks) and orange circles are average minerals abundances for all ocks that cover each dune field (Global Summary all ocks worksheets). The shaded boxes cover data that is below the detection threshold limit for the modeled minerals. EQ, equatorial; SP, south polar.